

App. No. 10/506,492
Amendment dated January 17, 2006
Reply to Office action of October 17, 2005

REMARKS

1. Claims 1 through 16 were originally presented in this application. No claims have been added, canceled, or amended in this paper. Claims 6, 7, 8, 9, 10₆ (as dependent on claim 6), and 11, 12, 13, 14, 15, and 16 were allowed. Claims 1 through 16 remain pending.

It is noted that under "Allowable Subject Matter," the Office action lists claims "13₁ and 13₆," and "14₁ and 14₆" as being allowable. Nevertheless, Applicants' preliminary amendment filed August 31, 2004 deleted the multiple dependency language in claims 13 and 14, leaving them each dependent from claim 11. For clarity in the record, the preset reply contains a listing of the claims in their status as resulting from the August 31, 2004 preliminary amendment.

2. Independent claim 1 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,693,544 to *Yamasaki et al.* in view of U.S. Patent 5,138,495 to *Shiono et al.* In particular, the Examiner states:

Yamasaki et al. disclose optical fibers 13B, 13C, 13D, and 13E having diffractive films 17B, 17C, 17D, and 17E respectively, formed upon the end portion of the optical fibers. However, Yamasaki et al. do not disclose the use of a DLC layer, nor a diffractive grating included in the DLC layer.

The Examiner goes on to state:

Shino et al. disclose the use of a diffractive optical lens coated with a diamond layer 12 This diamond layer, after formation, exhibits the structure and function of a diffraction grating, as it contains areas of high refractive index and low refractive index (within 'peaks' and 'valleys' of the surface of the diamond layer) and is able to diffract incident light according to wavelength.

The Examiner then concludes:

It would have been obvious to one of ordinary skill in the art to combine the above teachings to produce an optical fiber with a diffraction film upon its end face.

3. Applicants respectfully traverse this rejection. As recited in independent claim 1, the instant invention is directed to an optical fiber including an optically diffractive DLC layer formed on an end of the fiber (or on an endface of a collimator joined to the fiber). The DLC layer includes local regions of relatively high refractive index and local regions of relatively low refractive index. In other words, the DLC

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layer is an optical element in the apparatus. In particular, the DLC layer includes a diffraction grating that is intended, for example, to separate a single beam of light into a plurality of beams or to combine a plurality of beams of light into a single beam (see, for example, Fig. 1 of the present specification).

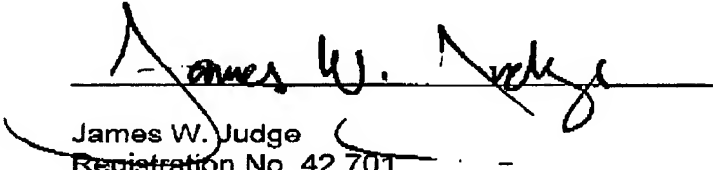
4. Applicants submit that the combination of references cited by the Examiner (*Yamasaki et al.* and *Shiono et al.*) fails to teach (as required by MPEP 2143) the elements of original claim 1. The Examiner asserts that *Shiono et al.* teach a diamond film 12 having the same structure and function as the DLC film recited in claim 1. Applicants respectfully submit that this is simply not the case. On the contrary, *Shiono et al.* disclose a reflection type diffractive optical lens including a protective layer 12 deposited on the back side of a reflection layer 6 (Fig. 13, and column 9, lines 37-40). The purpose of protective layer 12 is to protect the reflection layer 6 against physical scarring and oxidation (column 9, lines 46-54). It is particularly important to note that the protective layer 12 is not even an optical element in the disclosed lens. As clearly shown in Fig. 13, the protective layer 12 is deposited on the back side of the reflection layer 6. In other words, as shown in Fig. 13 of *Shiono et al.*, the light is incident 2 on the left side of the lens, passes through grating zone 5, and reflects off of the reflection layer 6 to the left 3. Incident light 2 never passes through the protective layer 12 because the protective layer 12 is deposited on the back side (the right side in Fig. 13) of the reflection layer 6. As such, the protective layer 12 is clearly not an optical element in the lens.
5. Moreover, *Shiono et al.* does not teach, nor even suggest, that protective layer 12 includes a "diffraction grating" or even "local regions of relatively high refractive index and local regions of relatively low refractive index" as recited in original claim 1. In fact, *Shiono et al.* do not even teach that the protective layer 12 is transparent (as is the DLC layer recited in claim 1). Rather, the protective layer apparently includes any layer capable of protecting the reflection layer 6, such as metals, paints, lacquers dielectrics, graphite, etc. Such materials are clearly not transparent.
6. For the foregoing reasons, Applicants respectfully submit that independent claim 1, as originally presented, is allowable over the cited prior art. Therefore, Applicants request reconsideration and allowance of claim 1. Independent claim 1 being allowable, it follows that dependent claims 2, 3, 4, 5, and 10₁ (as dependent on claim 1) must also be allowable, since these dependent claims carry with them all of the elements of independent claim 1, to which they ultimately refer.

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Accordingly, Applicant courteously urges that this application is in condition for allowance. Reconsideration and withdrawal of the rejections is requested. Favorable action by the Examiner at an early date is solicited.

Respectfully submitted,

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